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Specification and Drawings, as originally filed, with Application for Patent Serial No: **2,493,907**, on January 24, 2005, by **OZ COMMUNICATIONS**, assignee of Haraldur Thorkelsson, Leonard D'Cunha, Teresa Hunkeler, Sylvain Legault, Vaclav Mares and Steve Menard, for "Wireless E-Mail System."

L. Régimbal
Agent certificateur/Certifying Officer

February 10, 2006
Date

Canada

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TITLE OF THE INVENTION

WIRELESS E-MAIL SYSTEM

BACKGROUND

IMAP and POP3 are standard e-mail signalling protocols implemented by many "e-mail" servers. The sequence of using the signals defined in the protocols, as well as the content and user interface that is presented to the user, are not defined by any standard protocol. In order to present the content to the end-user via standard protocols such as IMAP and POP3, or via proprietary protocols such as Hotmail's MSP, the client must retrieve the information from the e-mail server, and process the data to present it in the desired format. This requires significant signalling, processing and memory usage on the part of the client.

For mobile wireless communication devices, where devices are constrained by memory size and processing capabilities, using IMAP, POP3 and SMTP (or any other proprietary wireline e-mail protocol) to interface directly with e-mail servers results in high latencies, increased battery consumption and large memory requirements. Furthermore, cellular wireless networks typically impose that radio channels be assigned to the wireless mobile devices for data transactions, rather than to make use of random access channels, which consumes network capacity. In addition, the above channel assignment process takes time, which inherently adds to latency. Ideally, a minimum amount of channel assignments should be made. Also, standard e-mail protocols are generally "chatty" and require multiple signal exchanges for each simple process.

One further problem with present wireless mobile e-mail technology is that when the client device uses an e-mail protocol such as IMAP/SMTP, the application is not visible in the mobile operator network. Essentially, the traffic appears in the mobile network as data traffic, and is not distinguishable from other types of data traffic, such as for example web browsing. As a result mobile operators are not able to monitor the usage or to provide specific subscriptions based on such e-mail services.

In summary, the problem is largely a specific consequence of the design of the IMAP and POP3 protocols, which were conceived for use over landline networks where latency is low, bandwidth relatively cheap and network availability high. Furthermore the IMAP and POP3 protocols expect a smart thick client (such as that available on a PC) that is able to process large amounts of complex data, which are not readily available for wireless mobile devices.

Presently, IMAP and POP3 exist on some mobile communication devices, allowing the client device to retrieve and transmit e-mails directly with the e-mail server. Additionally, web-portal based e-mail, such as that provided by Yahoo! and Hotmail, are also available on wireless mobile devices using WAP browsers.

Other mobile e-mail solutions use synchronization as a method for ensuring that the data on the mobile device and remote server are consistent. Synchronization allows for use in offline mode, where changes to the data set on the client or on the server can happen independently, and updates to both data sets are made during the synchronization procedure. For mobile communications systems that allow for an "always-on" connection, changes to the data set that are made in the mobile device may be reflected immediately in the remote server, eliminating the need for synchronization.

Finally, an alternative solution for wireless e-mail is disclosed in US Patent No. 6,701,378, in which e-mails are received by a redirector software, and forwarded immediately to the mobile device based on filtering rules. These filtering rules, specific to each mobile device, require persistent storage in the redirector software. This system also requires that the e-mail server forwards each e-mail to the wireless redirector software.

Consequently, prior art wireless mobile e-mail systems can be divided into the following two categories:

1) Enterprise focused e-mail access using IMAP, POP3 or proprietary means to grant access to enterprise e-mail. This solution is typically costly on a monthly bases and requires a relatively expensive handset.

2) Simple and limited WAP based e-mail access for consumers and other users.

SUMMARY OF THE INVENTION

To address the above and other drawbacks of the prior art wireless e-mail systems, a novel wireless e-mail system is provided which allows for a wireless mobile device to support a thin client for e-mail functions, with most of the processing offloaded to an external platform that is not significantly constrained by memory, processing capability or power supply.

The client initiates the request in the format that allows it to retrieve the information it requires to be displayed in a single request/response pair. (This is in contrast to standard e-mail protocols which require multiple transactions and significant processing on the part of the client to extract the required information). Additionally, the client device is not required to maintain a persistent session with the e-mail server, or the gateway, in order to initiate subsequent transactions, as is required by IMAP or POP3. Each request is self-contained, eliminating any need for user-specific information to be stored on the gateway, including filters. The system performs a relevant transfer of a small subset of the data as requested by the user. A single sessionless request/response pair is used for each of those transactions initiated by the client.

Furthermore, the gateway may contain configuration options to allow for different system behaviours based on mobile operator preferences or specific handset-type limitations. The configurable options may comprise:

i) The number of e-mails to include per page view of the mailbox (e.g. 10 e-mails per page view).

ii) Which fields to include per page view of the mailbox (e.g. subject, from, date); and

iii) The maximum size of an e-mail message to download at a time (e.g. 10 kB).

Other objects, advantages and features of the present invention will become more apparent upon reading of the following non-restrictive description of illustrative embodiments thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference will now be made to the accompanying drawings, showing by way of illustration an illustrative embodiment of the present invention, and in which:

Figure 1A schematically illustrates a wireless e-mail system in accordance with an illustrative embodiment of the present invention;

Figure 1B schematically illustrates a wireless e-mail system in accordance with an alternative illustrative embodiment of the present invention;

Figure 2 schematically illustrates the communication interfaces employed in the wireless e-mail systems of Figures 1A and 1B;

Figure 3 presents a block diagram providing a functional overview of the E-mail Gateway of Figures 1A and 1B in accordance with an illustrative embodiment of the present invention;

Figure 4 presents a flow chart of a high-level sequence of events of a single wireless e-mail transaction between an end user, an e-mail gateway and an e-mail server in accordance with an illustrative embodiment of the present invention; and

Figure 5 presents a flow chart of a possible implementation of an e-mail thin client in accordance with an illustrative embodiment of the present invention.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

Referring now to Figure 1A, a wireless e-mail system, generally referred to using the numeral 10, and in accordance with an illustrative embodiment of the present invention, will now be described. The wireless e-mail system 10 generally comprises the following components:

A) At least one end user wireless mobile device, as in 12, such as GSM mobile phones and the like, or any other wireless device including palm and pocket PCs, PDAs, etc;

B) A mobile operator network 14;

C) An e-mail gateway 16 that has connectivity to the mobile operator network 14 and the e-mail server 18; and

D) At least one e-mail server, as in 18, from at least one e-mail service provider, as in 20.

Each mobile device 12 will generally comprise ROM, RAM, a processor, a removable/reusable battery as well as a user interface, input means (e.g. keypad, stylus, touch screen, voice recorder) and display means (color or monochrome display or displays) for interfacing with the user and providing visual access to e-mail and other communicated and stored information. The wireless device 12 will also comprise wireless connection capabilities, such as GSM, cdma2000, UMTS or other such capabilities, for wirelessly connecting to and communicating with a mobile network. Furthermore, in order to support the present wireless e-mail system, each mobile device 12 implements an additional e-mail thin client 22 typically in the form of a software program residing on each wireless mobile device 12. The primary functions of the e-mail thin client 22 are to:

A) Interface with the end user to allow for user input and to display the requested e-mail information;

B) Use a specific interface (Interface A of Figure 2 further described hereinbelow) to request services from the e-mail gateway 16; and

C) Provide a common implementation base for different user interfaces from the different e-mail service providers 20.

The mobile operator network 14 is basically any network supporting any type of wireless data communication such as GSM, cdma2000, UMTS, or other such systems. The mobile operator network 14 provides the wireless data communication system (dashed lines) between the various mobile wireless devices 12 and the landline network (solid lines) connecting the various e-mail servers 18 of each service provider 20.

The e-mail service providers 20, and respective e-mail servers 18, support standard or proprietary e-mail signalling protocols such as IMAP, POP3, Hotmail's MSP, or other such protocols for the management and retrieval of e-mails, as well as standard or proprietary signalling protocols, such as SMTP, Hotmail's MSP or other such protocols for sending e-mails. E-mail service providers may include, but are not limited to, Yahoo! Mail, AOL Mail, Hotmail, or any other common consumer-based ISP e-mail servers, web-based e-mail providers or corporate e-mail providers. Basically, the e-mail servers 18 in the illustrated embodiments operate as they would with standard communications established by prior art wired and wireless devices. Yet, while the e-mail client 22 may be implemented using a standard protocol (for example communicating over HTTP), its implementation will be executed in a unique way. For example, if a mail is deleted by the end user, it may or may not be required that the client 22 move the e-mail to the "Deleted Items" folder. The signals used in the protocol are standard, but the sequence of the signals and the overlying structure of the e-mail client 22 may be unique depending on the implementation.

The primary functions of the e-mail gateway 16 are to offload processing and signalling for e-mail access from multiple wireless mobile devices, as in 12, onto an external platform that is part of the wired network (solid lines in Figures 1A, 1B, 2 and 3), and to allow the mobile network operator 16 to monitor usage of the specific e-mail service. The gateway furthermore allows the wireless mobile devices 12 to implement a thin client 22 that can support multiple user interfaces of the different e-mail service providers 20. The main functions of the gateway 16 include:

(A) Processing requests from the e-mail thin client 22 of each wireless mobile device 12;

(B) Translating the standard e-mail protocols based on implementation of a specific e-mail service (e.g. Yahoo vs. AOL);

(C) Generating billing reports and billing data;

(D) Monitoring traffic and generating traffic reports;

(E) Allowing for the mobile operator to configure settings in a particular deployment or for a particular handset type.

In particular, referring to function (E) above, the gateway may contain configuration options to allow for different behaviour based on mobile operator preferences or on specific handset-type limitations. The configurable options may comprise:

(i) The number of emails to include per page view of mailbox (e.g. 10).

(ii) Which fields to include per page view of mailbox (e.g. subject, from, date); and

(iii) The maximum size of an e-mail message to download at a time (e.g. 10 kB).

Adding reference to Figures 2 and 3, and in accordance with an illustrative embodiment of the present invention, the e-mail gateway 16 generally serves as a bridge between the wireless devices 12 and the service providers 20. As will be discussed in greater detail below, the gateway 16 must process requests incoming from the client 22 of devices 12 using a first interface, that is Interface A of Figure 2, and communicate those requests to the e-mail servers 18 of the e-mail service providers 20 using a second interface, Interface B. Consequently, as presented in Figure 3, incoming requests from the client 22 are first processed by

the Interface A processor 26, and expedited to a requested e-mail server 18 using Interface B. Once the information requested by the client 22 is gathered using Interface B (possibly through multiple transactions as described further hereinbelow) and processed by the Interface B processor 28, it is returned to the client 22 using Interface A.

As will be described further hereinbelow, Interface A is designed to provide a simple and unique interface using single self-contained request/response pairs 30, for example over HTTP, between the wireless devices 12 and the gateway 16. These request/response pairs 30 also allow for the piggybacking of requests in a single self-contained pair. For example, both a request for the Inbox view as well as a request for the list of folders may be combined in a single request to the gateway 16.

Conversely, Interface B is essentially any interface supported by the various e-mail providers, namely using such signalling protocols as IMAP, SMTP, POP3 and other common or proprietary protocols, and may use multiple transactions 32 for a single request 34, as common with such protocols. Necessarily, the implementation of the Interface B processor 28 is largely dependent on the particular e-mail service provider 20 the gateway 16 is requested to interact with.

In addition to its Connection Management function 36, generally described hereinabove, the gateway 16 will also provide for event monitoring and reporting 38, billing data generation 40, and an interface to the authorization and accounting systems of the mobile operator 42. Since the gateway 16 must be used to complete wireless e-mail transactions requested by the end user, the present e-mail system 10 will provide visibility in the mobile operator network 14, allowing e-mail traffic to be distinguishable from other data traffic, such as for example web browsing. In prior art wireless e-mail systems using IMAP or POP3 protocols, such transparency is not provided to the mobile operator, limiting billing and subscription capabilities in those systems.

Essentially, the novel wireless e-mail system 10 of the illustrative embodiments of the present invention allows for a wireless mobile device 12 to support a thin client 22 for e-mail functions, with most of the processing offloaded to an external

platform, such as gateway 16, that is not significantly constrained by memory, processing capability or power supply (common restrictions in portable wireless devices as in 12). In the illustrative embodiment of Figure 1A, the gateway 16 is illustrated as being an extension of the mobile operator network 14. In the alternative embodiments illustrated in Figure 1B, the e-mail gateways 16_2 and 16_3 of e-mail wireless system 10' are illustrated as extensions to e-mail servers 18_4 and 18_5 of service provider network 43 and Corporate Network 44 respectively. In both embodiments (10 and 10'), processing is substantially offloaded to the gateways 16, independent of their specific position within the e-mail systems 10 and 10'. Yet, as the gateways 16_2 and 16_3 are coupled to the respective e-mail servers of service provider network 43 and corporate network 44, the monitoring and billing features of the gateways 16_2 and 16_3 will inherently be respectively interfaced with the service provider network 43 and the corporate network 44 instead of with the mobile operator network 14.

Referring now to Figures 1A and 2, and in accordance with an illustrative embodiment of the present invention, the wireless e-mail system 10, as mentioned hereinabove, makes use of two distinct interfaces to complete each e-mail transaction: Communications between the client 22 and the gateway 16 use Interface A, whereas communications between the gateway 16 and the e-mail servers 18 use Interface B.

Interface A is a request/response interface with the request generally originating from the client 22. Using Interface A the client initiates a request in a format that allows it to retrieve the information it requires to be displayed in a single request/response pair 30. Unlike standard e-mail protocols which require multiple transactions and significant processing on the part of the client to extract the required information, Interface A allows for a single transaction 30 between the client 22 and the gateway 16 for each user request. As each request is self-contained, there is no need for user-specific information, such as filters, to be stored on the gateway 16. The system perfoms a transfer of a small subset of the data as requested by the user using a single sessionless request/response pair 30 over HTTP for each of the transactions initiated by the client 22. Consequently, the client device is not required to maintain a persistent session with the e-mail server 18, or the gateway 16, in order to initiate subsequent

transactions, as is required by IMAP or POP3. Furthermore, each time the client 22 is launched, it will retrieve the most recent information via Interface A, which means the client 22 is not required to keep persistent storage of the user data (e-mail messages) in memory for extended periods of time. Subsequently, data can be fetched just-in-time for each user request. On the other hand, although no sessions are required between the client and the gateway for communication purposes, a session may optionally be used to allow for additional security, for example use of HTTPS between the client and the gateway.

Specifically, Interface A is a request-response interface, wherein the request, as mentioned hereinabove, generally originates from the wireless thin e-mail client 22. The client request commands are generally grouped into two categories: one for content retrieval (see Table 1 hereinbelow), and the other for sending or modifying content (see Table 2 hereinbelow). Furthermore, as discussed hereinabove, Interface A also allows for the piggybacking of requests in a single request/response pair. In practice, Interface A may be implemented using an XML structure, though other similar structures may also be used. Specific examples of such commands will be discussed further hereinbelow with reference to Tables 1 and 2.

As for communications between the gateway 16 and the various e-mail servers 18, Interface B is used. Essentially, Interface B is any interface supported by the various e-mail providers 20, namely using such signalling protocols as IMAP, SMTP, POP3 and other common or proprietary protocols. In other words, if the user seeks e-mail connectivity with an e-mail service provider 20 using IMAP/SMTP as signalling protocols, the gateway will configure the client request provided through Interface A such that Interface B also uses IMAP/SMTP as signalling protocols. Consequently, though communications between the client 22 and the gateway 16 through Interface A use single request/response pairs 30, communications between the gateway 16 and the various service providers 20 through Interface B may include multiple transactions 32 for a single request 34. Since these transactions 32 are completed over a landline network, latency and bandwidth concerns common with wireless networks are less of an issue with the present configuration.

In Tables 1 and 2, the main content of Interface A is shown. The client request commands are grouped into two categories: one for content retrieval (Table 1), and the other for sending and modifying content (Table 2). Each request results in a response (not shown). Necessarily, the content of Interface A may include other components not listed here, without departing from the general concept provided by the wireless e-mail system 10.

Table 1: Client Requests used for Retrieving Content

Request	Main Record Filter	Main Field Filter	Comments
Get/Message Request	Message Identity	One or more of: Attachment Full text Partial text (referece by kB) (or any subfields from list directly below)	Use to retrieve an email message or multiple email messages
Get/Mailbox View	Mailbox Identity One of: Page Number Number of Pages	One or more of: To From Subject Date Size cc bcc /Read /Answered Attachment Flag Attachment Name(s) Partial Text	Use to retrieve a list of messages in a mailbox page
Get/Account View	One of: Full list System list	One or more of: Folder Capabilities: Read/ Write/Delete/Rename Total number of messages Total unread messages	Used to retrieve a list of folders (mailboxes), and their capabilities
Get/Address	One of: Full list Letter range (e.g. A-C) Search field		Used to retrieve an address

Table 2: Client Requests used for Sending and Modifying Content

Request	Main Content of Message	Comments
Put/Send	Message Header and Content	Used to send new message
Put/Forward	Message Identity, Header and Content	Used to forward a message
Put/Reply	Message Identity, Header and Content	Used to reply to a message
Put/Notification Flag	On/Off Setting	Sent to server if interface exist for email notification and ability to turn email notification on/off
Add/Message	Message Header and Content	Used to add a message to a mailbox (e.g. store draft)
Replace/Message	Message Identity and new mailbox name	Used to move a message to a new mailbox
Delete/Message	Message Identity	Used to delete a message
Delete/Account View	Mailbox Identity	Used to delete a mailbox (folder)
Put/Account View	Mailbox Name	Used to create a new mailbox (folder)
Replace/Account View	Old and new mailbox names	Used to Rename a mailbox (folder)

As mentioned hereinabove, Interface A also includes a "response" primitive, which occurs for each request generated by the client 22. Finally, while a single request-response transaction 30 is required and used through Interface A to communicate with the gateway, multiple transactions 32 through Interface B using IMAP/SMTP may be used between the gateway 16 and the service provider 20 to gather all of the information requested by the client 22 without generating any latency and/or bandwidth concerns in the system 10.

Referring now to Figures 1A, 1B and 4, and in accordance with an illustrative embodiment of the present invention, a high-level sequence of events of a single wireless e-mail transaction between an end user, an e-mail gateway 16 and an e-mail server 18 using the wireless e-mail system 10 is presented.

The wireless e-mail transaction starts with a user input at step 50;

In the following step 52, the client 22 of the user's wireless device 12 requests the gateway 16 to either fetch, process, or send a specific set of information (including forward and reply requests) based on the user action of step 50 using the protocol of Interface A. This request is sent over the wireless network as a single self-contained request;

In step 54, the gateway 16 communicates with the e-mail server 18 of the selected e-mail service provider 20, service provider network 44 or corporate network 46, and compiles the requested information from the e-mail server 18 using the protocol of Interface B (e.g. POP3, IMAP, SMTP, MSP). Unlike in step 52, communications in this step may include multiple transactions 32 as communications are executed over a landline connection and are thus not limited to bandwidth and latency issues experienced using wireless connections;

In step 56, the gateway 16 sends the requested information to the client 22 in a single transfer, again using Interface A over the wireless network, completing the single request/response pair 30;

In step 58, the requested information is presented to the user.

As will now be apparent to a person of skill in the art, the wireless e-mail system 10 described herein allows for low cost thin clients, as in 22, to access e-mail over a wireless network. The thin client 22 can be branded to reflect the look and feel of the e-mail service provider 20 the user has selected (for example Hotmail, Yahoo! mail, AOL mail or other such e-mail services). The client 22 on the mobile device 12 requires only minimal resources, but can still provide a "PC-like" experience to the end user that is far better than what can be offered over WAP, which has until now been the typical approach to e-mail on low end and mid range devices.

Referring now to Figure 5, a flow-chart presenting a possible implementation of an e-mail thin client in accordance with an illustrative embodiment of the present invention is presented. Once the user has launched the e-mail application, selected the desired e-mail service and entered appropriate user ID/password information, the gateway is requested to fetch a first set of information (e.g. first page of the Inbox) for display to the user. The user may then select from a plurality of requests/options (e.g. open e-mail, delete e-mail, compose new e-mail, view folder, view next page, etc...) that will be communicated to the gateway 16 and subsequently to the e-mail service provider 20. For each self-contained client request, the gateway 16 gathers the requested information or

response from the service provider, and transfers the data to the mobile client in a single response for display to the user. Furthermore, a minimum of necessary data/information is downloaded to the client for each request. For example, when a user requests that an e-mail be forwarded, or that a reply includes the original e-mail, the gateway is capable of regenerating the original e-mail without requiring that the client download the full original e-mail over the wireless network.

A thin client approach as described herein allows offloading of processing and signalling to a landline system that is less constrained by memory size or battery life. Consequently, the wireless e-mail system 10 reduces latencies and battery consumption as less signalling and processing are required of the mobile device 12. Furthermore, the use of a single just-in-time request/response pair for each query makes much more efficient use of the wireless interface thus minimizing radio use and fragmentation. The resulting traffic flow is consistent with user requests, queries and general use of the system, making service costs transparent and understandable. Finally, the system 10 allows for monitoring and billing of the e-mail service by the mobile operator 14.

While this invention has been described with reference to the illustrative embodiments, this description is not intended to be construed to a limiting sense. Various modifications or combinations of the illustrative embodiments, as well as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to the description. It is therefore intended that the described invention encompass any such modifications or embodiments.

WE CLAIM:

1. A wireless e-mail system comprising:

a wireless device comprising a client;

a server; and

a gateway comprising a first interface and a second interface, said client communicating with said gateway using said first interface and said server communicating with said gateway using said second interface;

wherein when said client communicates using said first interface a single self-contained request for a set of information to said gateway based on a user action, said gateway compiles said set of information from said e-mail server using said second interface, and sends a single self-contained response containing said set of information to said client using said first interface;wherein said request and said response form a sessionless request-response pair.

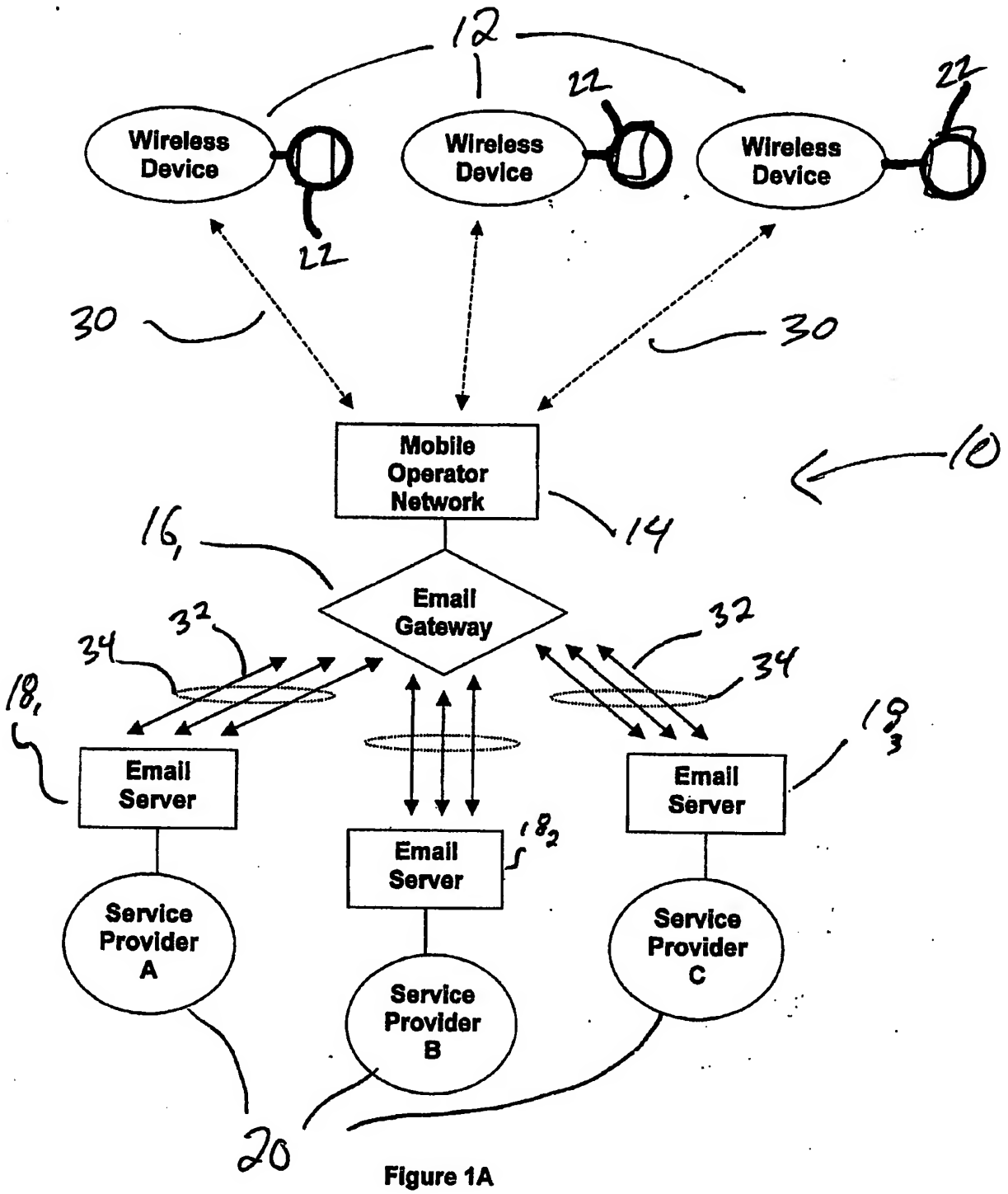
12
Wireless Device
Wireless Device
Wireless Device
22
22
22
30
30
Mobile Operator Network
14
10
16
Email Gateway
32
32
34
34
18
Email Server
Email Server
Email Server
18
2
19
3
Service Provider A
Service Provider B
Service Provider C
20

Figure 1A

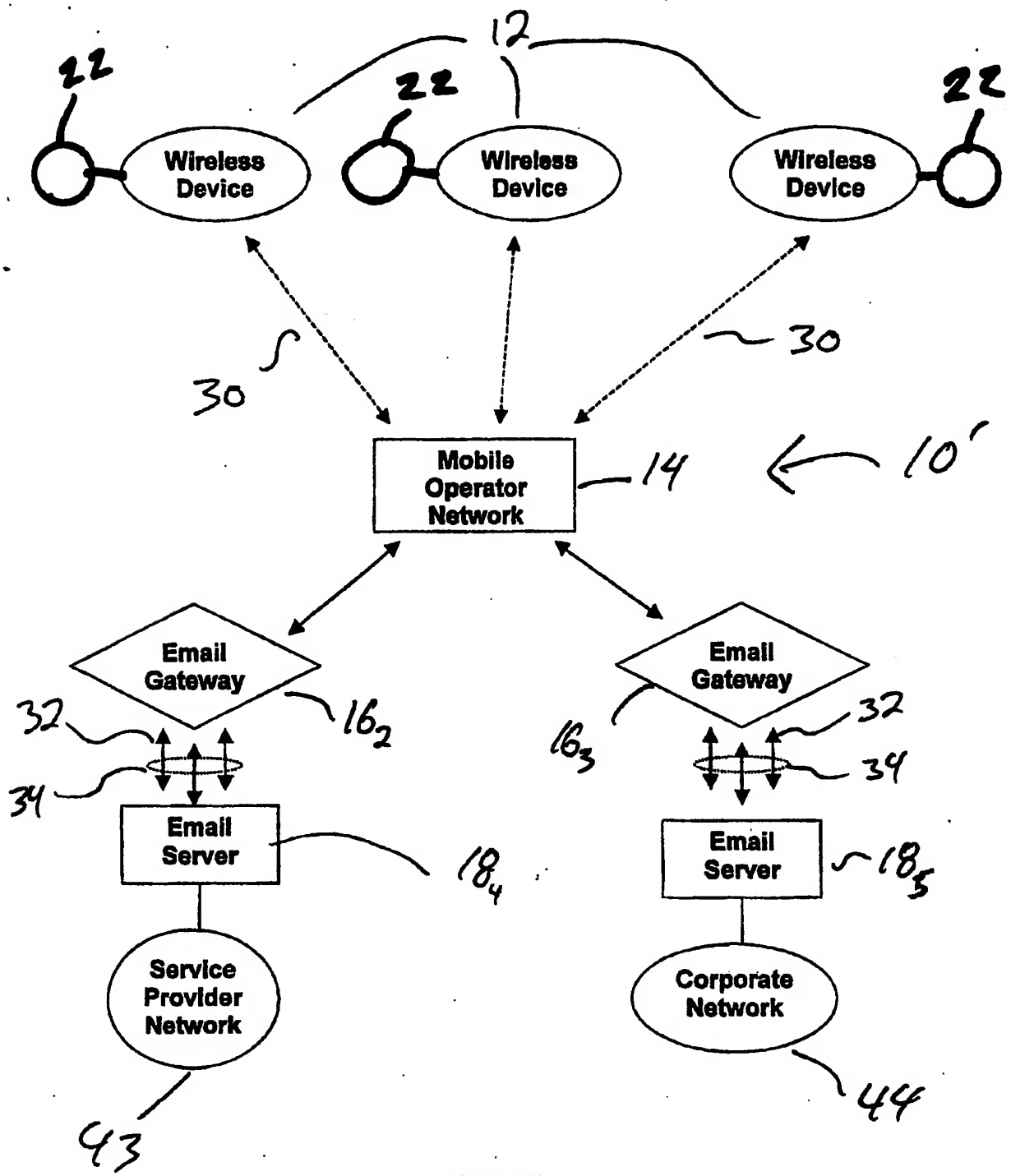
12
22
22
22
Wireless Device
Wireless Device
Wireless Device
30
30
Mobile Operator Network
14
10'
Email Gateway
Email Gateway
16₂
16₃
32
32
34
34
Email Server
Email Server
18₄
18₅
Service Provider Network
Corporate Network
43
44

Figure 1B

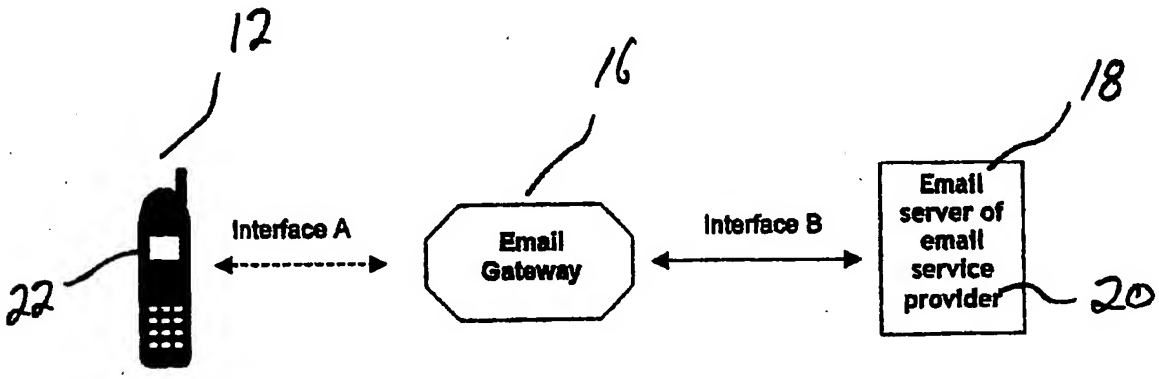
12
16
18
Interface A
Email Gateway
Interface B
Email server of email service provider
20
22

Figure 2

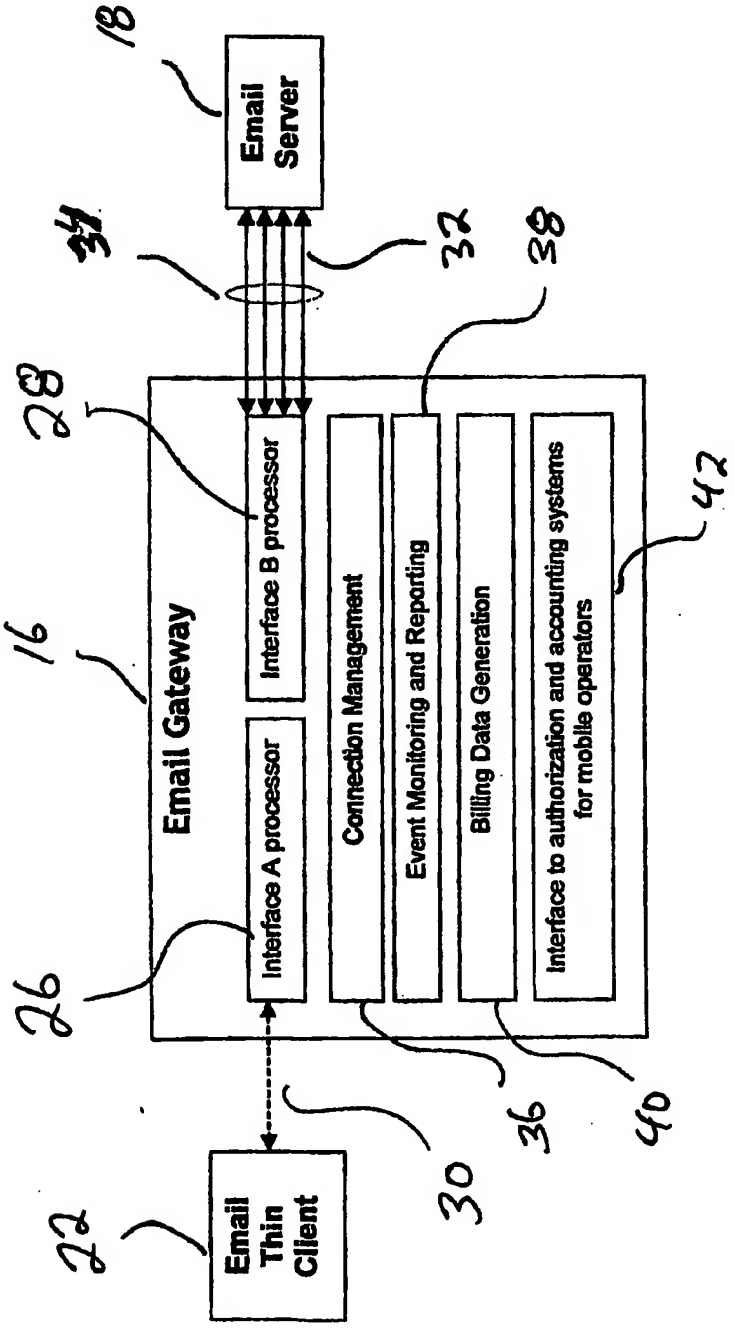
18
Email Server
34
32
38
28
Interface B processor
16
Email Gateway
Connection Management
Event Monitoring and Reporting
Billing Data Generation
Interface to authorization and accounting systems for mobile operators
42
Interface A processor
26
30
36
40
22
Email Thin Client

Figure 3

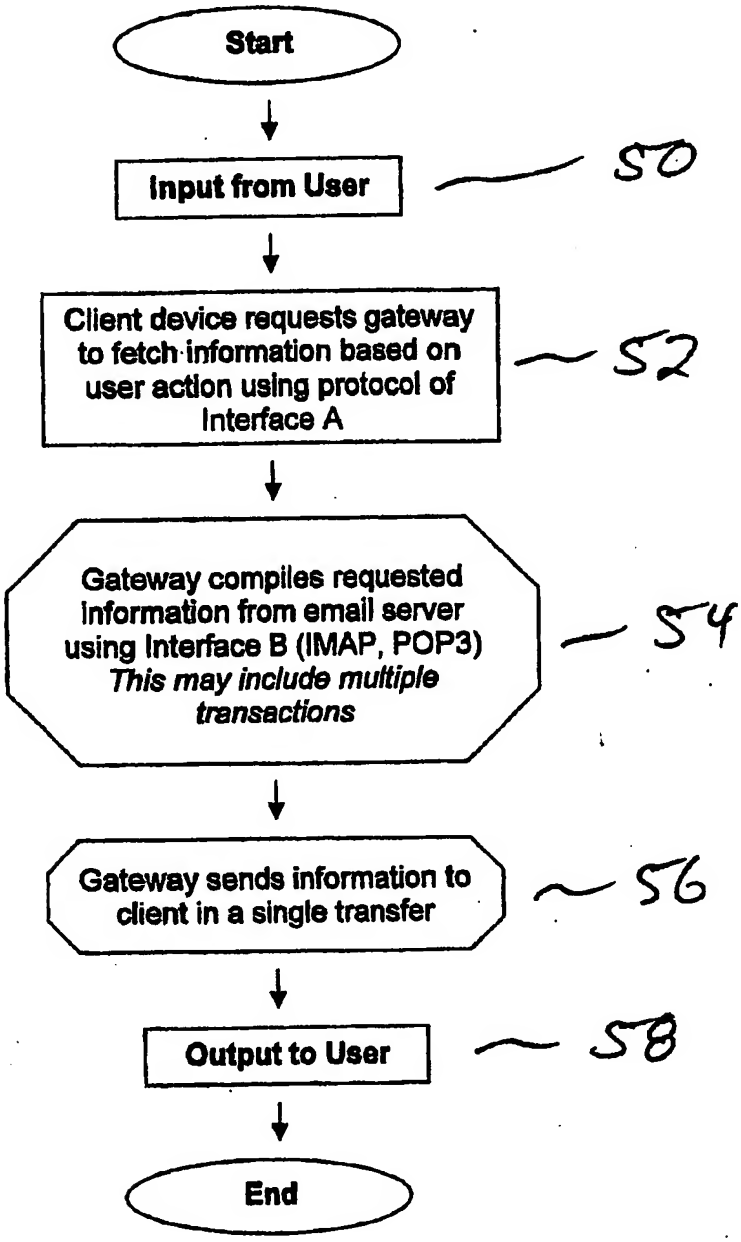
Start
Input from User
50
Client device requests gateway to fetch information based on user action using protocol of Interface A
52
Gateway compiles requested information from email server using Interface B (IMAP, POP3) This may include multiple transactions
54
Gateway sends information to client in a single transfer
56
Output to User
58
End

Figure 4

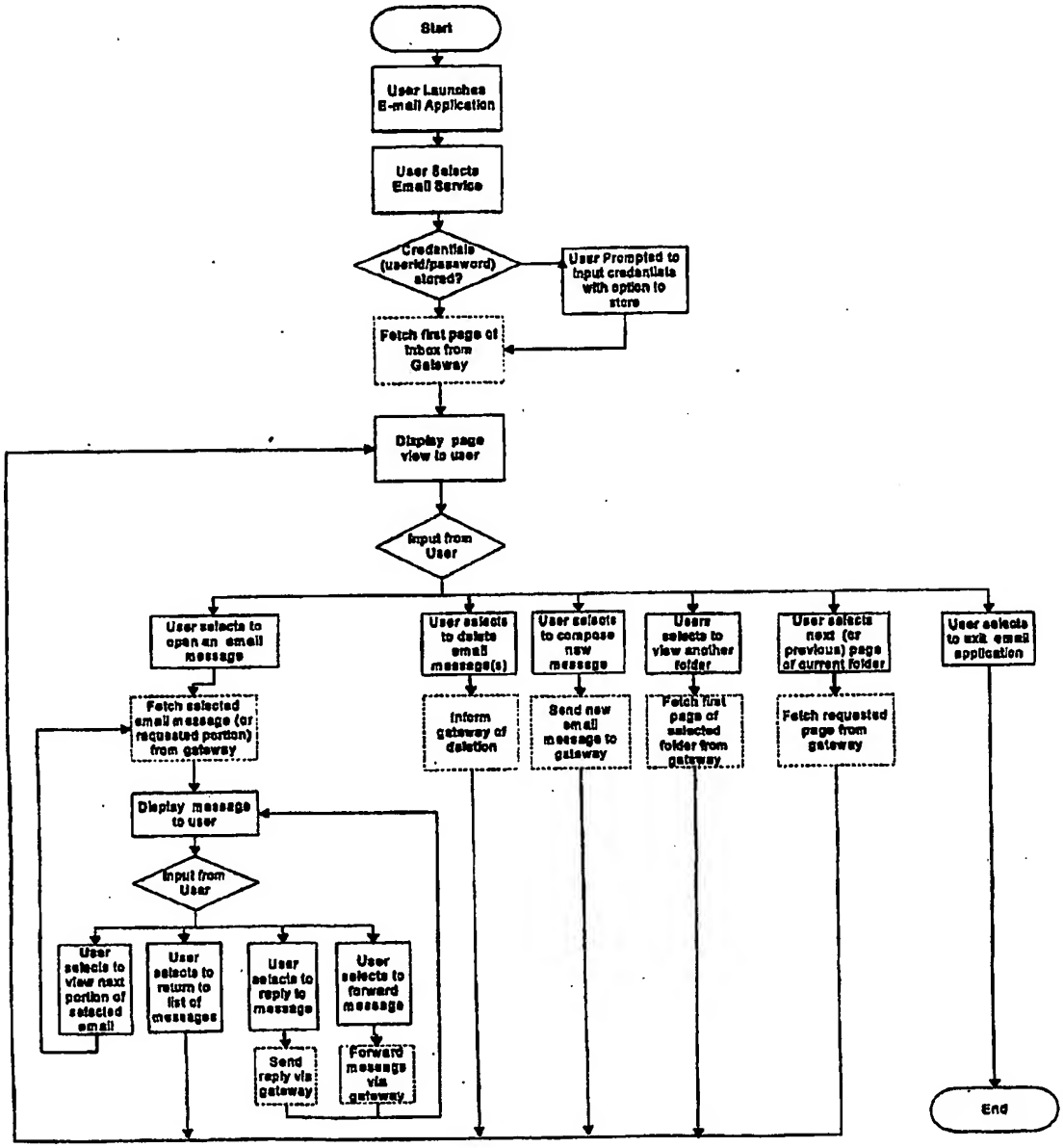
Start
User Launches E-mail Application
User Selects Email Service
Credentials (userid/password) stored?
User Prompted to input credentials with option to store
Fetch first page of Inbox from Gateway
Display page view to user
Input from User
User selects to open an email message
User selects to delete email message(s)
User selects to compose new message
User selects to view another folder
User selects next (or previous) page of current folder
User selects to exit email application
Fetch selected email message (or requested portion) from gateway
Inform gateway of deletion
Send new email message to gateway
Fetch first page of selected folder from gateway
Fetch requested page from gateway
Display message to user
Input from User
User selects to view next portion of selected email
User selects to return to list of messages
User selects to reply to message
User selects to forward message
Send reply via gateway
Forward message via gateway
End

Figure 5